WE CLAIM:

1. A process for recovery of thermal energy from an offgas stream said process comprising the following steps:

a) oxidizing an aromatic feedstock with a liquid phase reaction mixture in a reaction zone to form an aromatic carboxylic acid-rich stream and a gaseous mixture;

b) removing in a separation zone a substantial portion of a solvent from said gaseous mixture to form said offgas stream and a solvent rich stream; and

c) recovering said thermal energy from at least a portion of said offgas stream in a heat recovery zone; wherein a portion of said offgas stream is condensed to form a condensed mixture; wherein said condensed mixture is optionally recycled back to said separation zone; wherein a portion of said thermal energy is recovered in a working fluid; wherein a portion of the enthalpy in said working fluid is recovered in a power cycle; and wherein said working fluid is a compound or mixture of compounds that have a normal boiling point between about –100 °C to about 90° C.

2. A process according to claim 1 wherein a portion of said thermal energy from said offgas stream is used to produce steam.

3. A process according to claim 1 wherein said working fluid is selected from the group consisting of propane, isopropane, isobutane, butane, isopentane, n-pentane, ammonia, R134a, R11, R12, and mixtures thereof.

4. A process according to claim 2 wherein said working fluid is selected from the group consisting of propane, isopropane, isobutane, butane, isopentane, n-pentane, ammonia, R134a, R11, R12, and mixtures thereof.

5. A process according to claim 4 wherein said separation zone comprises a distillation column.

6. A process according to claim 5 where said distillation column is operated at a temperature of about 130 °C to about 220 °C.

7. A process according to claim 6 wherein said distillation column is operated at a pressure of about 3.5 barg to about 15 barg.

8. A process according to claim 1 wherein said power cycle is an organic rankine cycle or a kallina cycle.

9. A process for recovery of thermal energy from an offgas stream said process comprising the following steps:

a) removing in a separation zone a substantial portion of a solvent from a gaseous mixture to form said offgas stream and a solvent rich stream; and

b) optionally, recovering thermal energy from a portion of said offgas stream in a first heat recovery zone to produce a low pressure steam.

c) recovering thermal energy from a portion of said offgas stream in a second heat recovery zone utilizing a working fluid; wherein a portion of the enthalpy in said working fluid is recovered in a power cycle; wherein said working fluid is a compound or mixture of compounds that have a normal boiling point between about –100 °C to about 90° C; and

d) optionally, recovering thermal energy from a portion of said offgas stream in a third heat recovery zone.

10. A process according to claim 9 wherein said power cycle is an organic rankine cycle or a kallina cycle.

11. A process according to claim 9 wherein said working fluid is selected from the group consisting of propane, isopropane, isobutane, butane, isopentane, n-pentane, ammonia, R134a, R11, R12, and mixtures thereof.

12. A process according to claim 9 wherein said working fluid is a compound or mixture of compounds that have a normal boiling point between about –100 °C to about 60 °C

13. A process according to claim 1 wherein said first heat recovery zone comprises a heat recovery device operated at a temperature of about -100 °C to about 60 °C.

14. A process according to claim 13 wherein said second heat recovery zone comprises a heat recovery device operated at a temperature between about 80 °C to about 120 °C.

15. A process according to claim 14 wherein said third heat recovery zone comprises a heat recovery device operated at a temperature between about 20 °C to about 100 °C.

16. A process according to claim 15 wherein said first heat recovery zone comprises a partial condenser.

17. A process according to claim 16 wherein said second heat recovery zone comprises a heat recovery device selected from the group consisting of a condenser and a partial condenser.

18. A process according to claim 17 wherein said third heat recovery zone comprises a heat recovery device selected from the group consisting of a water cooler and an air cooler.

19. A process for recovery of thermal energy from an offgas stream said process comprising the following steps:

a) oxidizing an aromatic feedstock with a liquid phase reaction mixture in a reaction zone to form an aromatic carboxylic acid stream and a gaseous mixture;

b) removing in a separation zone a substantial portion of a solvent from said gaseous mixture to form said offgas stream and a solvent rich stream; and

c) optionally, recovering thermal energy from a portion of said offgas stream in a first heat recovery zone to produce a low pressure steam;

d) recovering thermal energy from a portion of said offgas stream in a second heat recovery zone using a working fluid in a power cycle; wherein said working fluid is a compound or mixture of compounds that have a normal boiling point between about –100 °C to about 90° C;

e) optionally, recovering thermal energy from a portion of said offgas stream in a third heat recovery zone.

20. A process according to claim 19 wherein said first heat recovery zone comprises a heat recovery device operated at a temperature of about 100 °C to about 160 °C.

21. A process according to claim 20 wherein said second heat recovery zone comprises a heat recovery device operated at a temperature between about 80 °C to about 120 °C.

22. A process according to claim 21 wherein said third heat recovery zone comprises a heat recovery device operated at a temperature between about 20 °C to about 100 °C.

23. A process according to claim 22 wherein said first heat recovery zone comprises a partial condenser.

24. A process according to claim 23 wherein said second heat recovery zone comprises a heat recovery device selected from the group consisting of a condenser and a partial condenser.

25. A process according to claim 24 wherein said third heat recovery zone comprises a heat recovery device selected from the group consisting of a water cooler and an air cooler.

26. A process according to claim 19 wherein said power cycle is an organic rankine cycle or a kallina cycle.

27. A process for recovery of thermal energy from an offgas stream said process comprising the following steps in the order named:

a) oxidizing an aromatic feedstock with a liquid phase reaction mixture in a reaction zone to form an aromatic carboxylic acid stream and a gaseous mixture;

b) removing in a separation zone a substantial portion of a solvent from said gaseous mixture to form said offgas stream and a solvent rich stream; and

c) recovering thermal energy from a portion of said offgas stream in a first heat recovery zone to produce a low pressure steam;

d) recovering thermal energy from a portion of said offgas stream in a second heat recovery zone using a working fluid in a power cycle; wherein said working fluid is a compound or mixture of compounds that have a normal boiling point between about –100 °C to about 90° C; and

e) recovering thermal energy from a portion of said offgas stream in a third heat recovery zone.

28. A process according to claim 27 wherein said first heat recovery zone comprises a heat recovery device operated at a temperature of about 100 °C to about 160 °C.

29. A process according to claim 28 wherein said second heat recovery zone comprises a heat recovery device operated at a temperature between about 80 °C to about 120 °C.

30. A process according to claim 29 wherein said third heat recovery zone comprises a heat recovery device operated at a temperature between about 20 °C to about 100 °C.

31. A process according to claim 30 wherein said first heat recovery zone comprises a partial condenser.

32. A process according to claim 31 wherein said second heat zone comprises a heat recovery device is selected from the group consisting of a condenser and a partial condenser.

33. A process according to claim 32 wherein said third heat recovery zone comprises a heat recovery device is selected from the group consisting of a water cooler and an air cooler.

34. A process according to claim 27 wherein said power cycle is an organic rankine cycle or a kallina cycle.